SUPER®

SAS2-216EL1/EL2 BACKPLANE

USER'S GUIDE

Rev. 1.0

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Table of Contents

Contacting Supermicro v
Returning Merchandise for Service vi
Overview of the SAS2-216EL1/EL2 Backplanes vii

Chapter 1 Safety Guidelines

1-1 ESD Safety Guidelines 1-1
1-2 General Safety Guidelines 1-1
1-3 An Important Note to Users 1-2
1-4 Introduction to the SAS2-216EL1/EL2 Model Backplane 1-2

Chapter 2 Connectors, Jumpers and LEDs

2-1 Connectors 2-1
2-2 Front Connector and Pin Definitions 2-2
2-3 Jumper Locations and Settings 2-3
Explanation of Jumpers 2-3
2-4 Front Connectors and LED Indicators 2-6

Chapter 3 Dual Port and Cascading Configurations

3-1 Single and Dual Port Expanders 3-1
Single Ports 3-1
Dual Ports 3-1
3-2 Failover 3-2
Single Host Bus Adapter 3-2
Single Host Bus Adapter Failover 3-2
3-3 Failover with RAID Cards and Multiple HBAs 3-3
Dual Host Bus Adapter 3-3
Dual Host Bus Adapter Failover 3-3
3-4 Chassis Power Card and Support Cables 3-4
Chassis Power Card 3-4
Connectioning an Internal Host Bus Adapter to the Backplane 3-5
Supported Internal HBA Cables 3-5
Connecting an External Host Bus Adapter to the Backplane 3-7
Single External Host Bus Adapter 3-7
Dual External Host Bus Adapter 3-7
Supported External HBA to Backplane Cable 3-8
Connecting Multiple Backplanes in a Single Channel Environment 3-9
Single HBA Configuration Cables 3-10
Connecting Multiple Backplanes in a Dual Channel Environment 3-11

Dual HBA Configuration Cables 3-12
3-5 Supported Cascading Configurations 3-13
Server System with Single SAS HBA 3-14
Dual SAS HBA and Cascaded Configuration 3-15
Dual SAS HBA and Cascaded Configuration with Branching 3-16

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Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

For faster service, RMA authorizations may be requested online (http://www.supermicro.com/support/rma/).

Whenever possible, repack the backplane in the original Supermicro box, using the original packaging materials. If these are no longer available, be sure to pack the backplane in an anti-static bag and inside the box. Make sure that there is enough packaging material surrounding the backplane so that it does not become damaged during shipping.

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alteration, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.

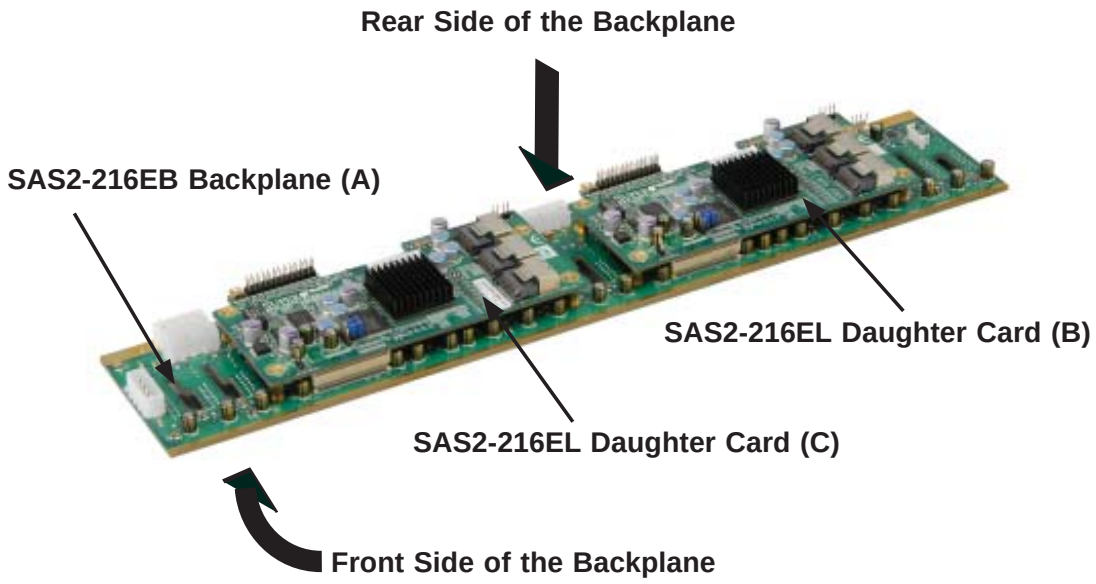
Overview of the SAS2-216EL1/EL2 Backplanes

The SAS2-216EL1/EL2 model backplanes consists of a SAS2-216EB backplane (A) with one or two SAS2-216EL daughter cards (B and C) mounted on the rear of the backplane.

The SAS2-216EL1 model consists of the SAS2-216EB backplane (A) and **one** SAS2-216EL daughter card (B), mounted on the right-hand side of the backplane.

The SAS2-216EL2 model consists of the SAS2-216EB backplane (A), and **two** SAS-216EL daughter cards (B and C), mounted on the rear of the backplane.

Components on the front side of the SAS2-216EB backplane include twenty-four SAS connectors and their respecitve activity and failure LEDs. Components on the rear side of the backplane include jumpers and power and fan connectors. The daughter card's components include SAS ports, flash and expander chips, and mode select jumpers.


Rear Side of the Backplane
SAS2-216EB Backplane (A)
SAS2-216EL Daughter Card (B)
SAS2-216EL Daughter Card (C)
Front Side of the Backplane

Notes

Chapter 1

Safety Guidelines

To avoid personal injury and property damage, carefully follow all the safety steps listed below when accessing your system or handling the components.

1-1 ESD Safety Guidelines

Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to your system, it is important to handle the backplane very carefully. The following measures are generally sufficient to protect your equipment from ESD.

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing a component from the antistatic bag.
- Handle the backplane and daughter cards by their edges only; do not touch the components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the backplane and peripherals back into their antistatic bags when not in use.

1-2 General Safety Guidelines

- Always disconnect power cables before installing or removing any components from the computer, including the backplane.
- Disconnect the power cable before installing or removing any cables from the backplane.
- Make sure that the backplane is securely and properly installed on the motherboard to prevent damage to the system due to power shortage.

1-3 An Important Note to Users

All images and layouts shown in this user's guide are based upon the latest PCB Revision available at the time of publishing. The card you have received may or may not look exactly the same as the graphics shown in this manual.

1-4 Introduction to the SAS2-216EL1/EL2 Backplane

The SAS2-216EL1/EL2 model backplane has been designed to utilize the most up-to-date technology available, providing your system with reliable, high-quality performance.

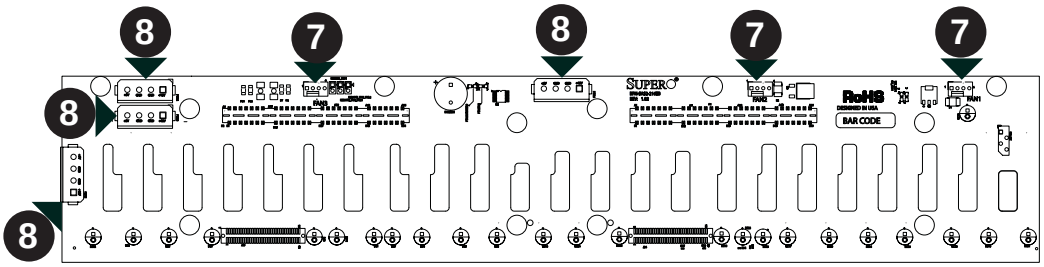
This manual reflects the SAS2-216EL Revision 1.02 backplane, the most current release available at the time of publication.

This manual also describes the SAS2-216EL daughter card, Revision 1.02, the most current release available at the time of publication. Always refer to the Supermicro Web site at www.supermicro.com for the latest updates, compatible parts and supported configurations.

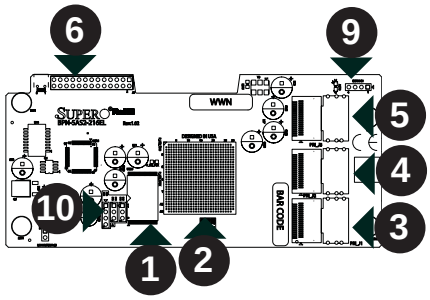
Chapter 2

Connectors, Jumpers and LEDs

2-1 Connectors



Rear of SAS2-261EB Backplane



Front of SAS2-2l6EL Daughter Card(s)

Figure 2-1: Connectors on the Backplane and Daughter Cards

Connectors

1. Flash Chip
2. Expander Chip
3. SAS Port: PRI_J1
4. SAS Port: PRI_J2
5. SAS Port: PRI_J3
6. EPP Connectors: J2
7. Fan Connectors: Fan1, Fan2, and Fan3
8. Power Connectors: PWR1 - PWR4
9. Debug Connector: EXPDBG1
10. UART Connector: SMART_UART

2-2 Front Connector and Pin Definitions

1. Flash Chips

The flash chip enhances the backplane memory.

2. Expander Chips

This expander chip allows the backplane to support dual ports, cascading, and failover.

3. - 5. SAS Ports

The primary and secondary sets of SAS ports provide expander features including cascading and failover. From right to left the ports are Primary 1,2,3 and Secondary 1,2,3.

6. EPP Ports

The EPP ports are used for manufacturer diagnostic purposes only.

7. Fan Connectors

The 3-pin connectors, designated FAN1, FAN2, and FAN3, provide power to the fans. See the table on the right for pin definitions.

Fan Connectors

Pin#	Definition
1	Ground
2	+12V
3	Tachometer

8. Backplane Main Power Connectors

The 4-pin connectors are designated PWR1, PWR2, PWR3 and PWR4. They provide power to the backplane. See the table on the right for pin definitions.

Backplane Main Power 4-Pin Connector

Pin#	Definition
1	+12V
2 and 3	Ground
4	+5V

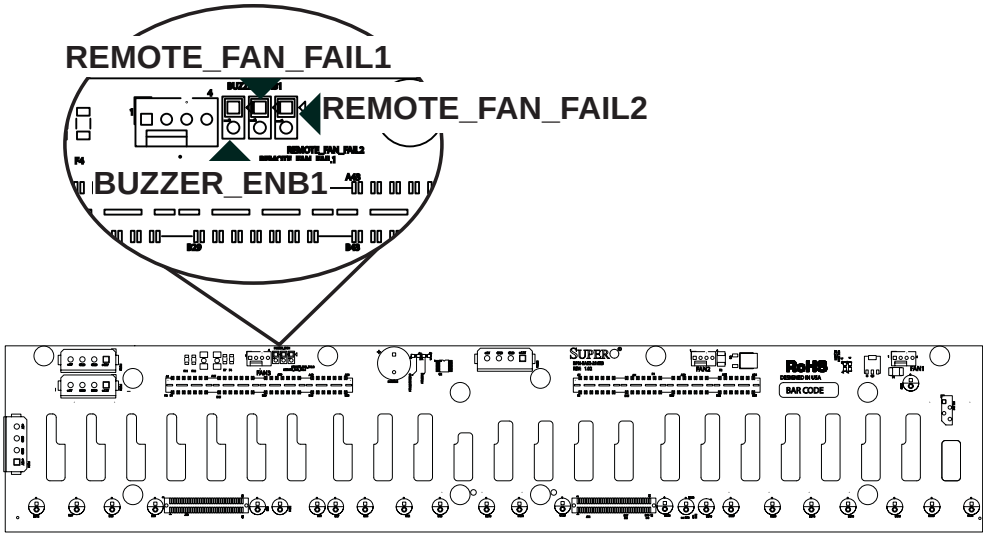
9. Debug Connector

The debug connector is designated EXPDBG1 and is used for manufacturer's diagnostic purposes only.

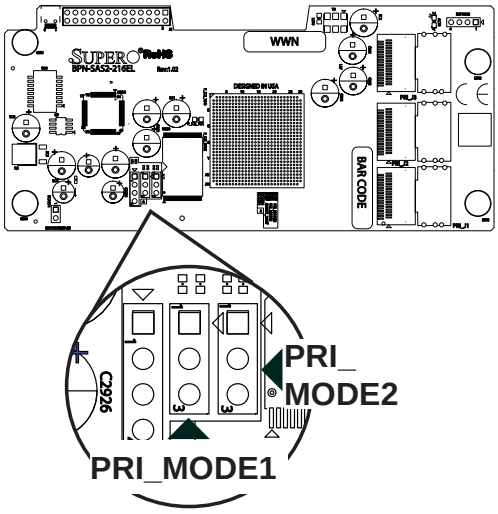
10. UART Connector

The UART connector is designated SMART_UART and is used for manufacturer's diagnostic purposes only.

2-3 Jumper Locations and Settings



Rear of SAS2-261EB Backplane

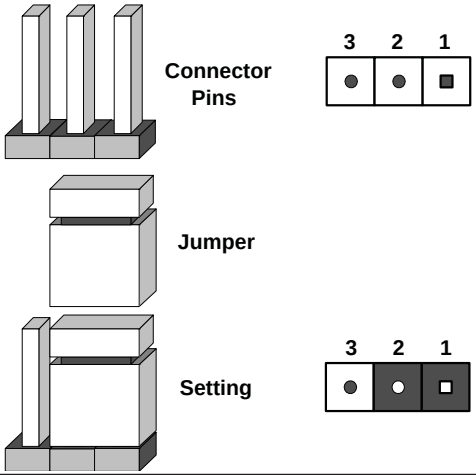


Front of SAS2-2l6EL Daughter Card

Figure 2-2: Jumper Locations and Pin Defimitions

Explanation of Jumpers

To modify the operation of the backplane, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. Note: On two pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.



General Jumper Settings		
Jumper	**Jumper Settings**	**Note**
PRI_MODE1	Pins 2-3	Factory setting, do not change
PRI_MODE2	Pins 2-3	Factory setting do not change
REMOTE_FAN_FAIL1	Open: Enable (Default) Closed: Disable	Enables / disables the fan speed reporting.
REMOTE_FAN_FAIL2	Open: Enable (Default) Closed:Disable	Enables / disables the FANFAIL1 LED
BUZZER_ENB1	Open: Disable Closed: Enable	Buzzer enable*

*The buzzer sound indicates that a condition requiring immediate attention has occurred.

The buzzer alarm is triggered by any of the following conditions:

1. Hard drive failure
2. Fan failure
3. System temperature over 45º Celsius.

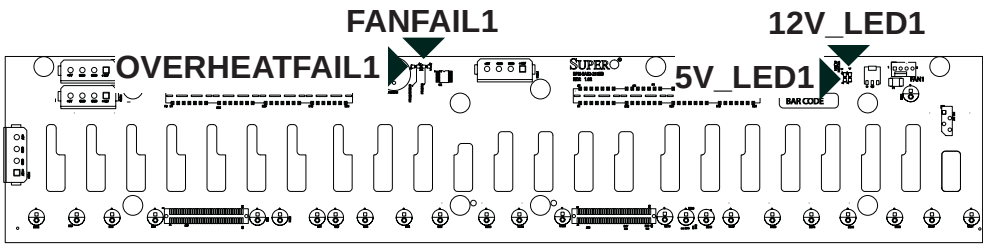


Figure 2-3: Rear LEDs

Rear LEDs		
LED	**Fail State**	**Specification**
12V_LED1	Off	Green LED indicates backplane 12V power. Light is on during normal operation.
5V_LED1	Off	Blue LED indicates backplane 5V power. Light is on during normal operation.
FANFAIL1	On	Red LED indicates a fan failure. Light is off during normal operation
OVERHEATFAIL1	On	Red LED indicates an overheat condition. Light is off during normal operation

2-4 Front Connectors and LED Indicators

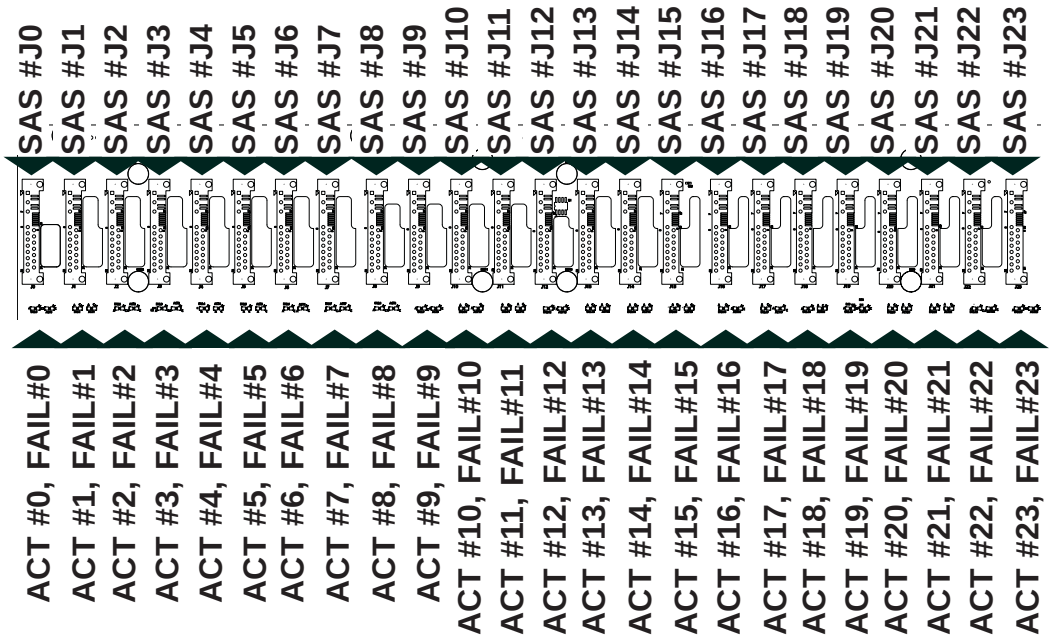


Figure 2-4: Front Connectors and LEDs

Front SAS/SATA Connectors			
Front Connector	**SAS Drive Number**	**Front Connector**	**SAS Drive Number**
SAS #J0	SAS/SATA HDD #1	SAS #J12	SAS/SATA HDD #13
SAS #J1	SAS/SATA HDD #2	SAS #J13	SAS/SATA HDD #14
SAS #J2	SAS/SATA HDD #3	SAS #J14	SAS/SATA HDD #15
SAS #J3	SAS/SATA HDD #4	SAS #J15	SAS/SATA HDD #16
SAS #J4	SAS/SATA HDD #5	SAS #J16	SAS/SATA HDD #17
SAS #J5	SAS/SATA HDD #6	SAS #J17	SAS/SATA HDD #18
SAS #J6	SAS/SATA HDD #7	SAS #J18	SAS/SATA HDD #19
SAS #J7	SAS/SATA HDD #8	SAS #J19	SAS/SATA HDD #20
SAS #J8	SAS/SATA HDD #9	SAS #J20	SAS/SATA HDD #21
SAS #J9	SAS/SATA HDD #10	SAS #J21	SAS/SATA HDD #22
SAS #J10	SAS/SATA HDD #11	SAS #J22	SAS/SATA HDD #23
SAS #J11	SAS/SATA HDD #12	SAS #J23	SAS/SATA HDD #24

Front LED Indicators		
Front LED	**Hard Drive Activity**	**Failure LED**
SAS #J0	ACT #0	FAIL #0
SAS #J1	ACT #1	FAIL #1
SAS #J2	ACT #2	FAIL #2
SAS #J3	ACT #3	FAIL #3
SAS #J4	ACT #4	FAIL #4
SAS #J5	ACT #5	FAIL #5
SAS #J6	ACT #6	FAIL #6
SAS #J7	ACT #7	FAIL #7
SAS #J8	ACT #8	FAIL #8
SAS #J9	ACT #9	FAIL #9
SAS #J10	ACT #10	FAIL #10
SAS #J11	ACT #11	FAIL #11
SAS #J12	ACT #12	FAIL #12
SAS #J13	ACT #13	FAIL #13
SAS #J14	ACT #14	FAIL #14
SAS #J15	ACT #15	FAIL #15
SAS #J16	ACT #16	FAIL #16
SAS #J17	ACT #17	FAIL #17
SAS #J18	ACT #18	FAIL #18
SAS #J19	ACT #19	FAIL #19
SAS #J20	ACT #20	FAIL #20
SAS #J21	ACT #21	FAIL #21
SAS #J22	ACT #22	FAIL #22
SAS #J23	ACT #23	FAIL #23

Notes

Chapter 3

Dual Port and Cascading Configurations

3-1 Single and Dual Port Expanders

Single Ports

SAS2-216EL1 model backplanes have a single-port expander on the daughter card that accesses all of the drives and supports cascading.

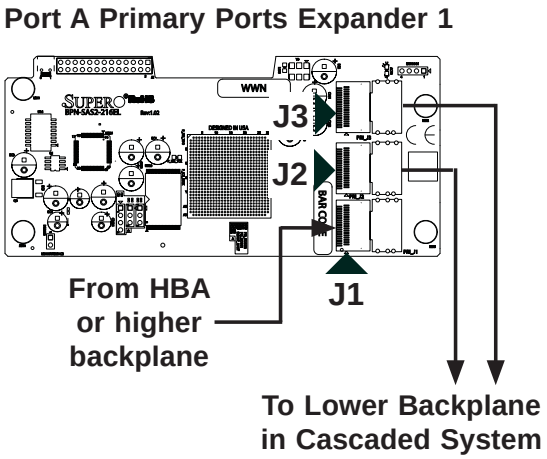


Figure 3-1: SAS2-216EL1 Single Port Configuration

Dual Ports

SAS2-216EL2 model backplanes have dual-port expanders on the daughter cards that access all of the hard drives. These dual-port expanders support cascading, failover, and recovery.

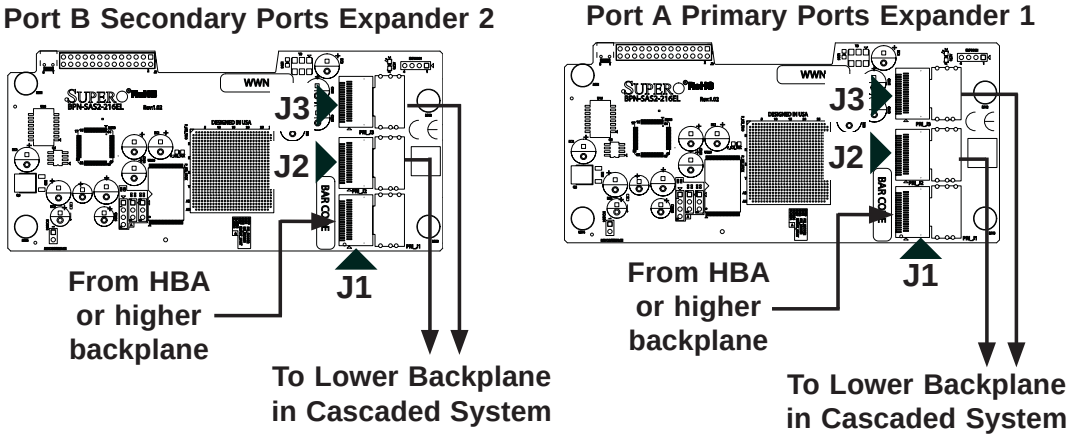


Figure 3-2: SAS2-216EL2 Dual Port Configuration

3-2 Failover

The SAS2-216EL2 model backplane has two expanders which enable effective failover and recovery.

Single Host Bus Adapter

In a single host bus configuration, the backplane connects to one Host Bus Adapter (HBA).

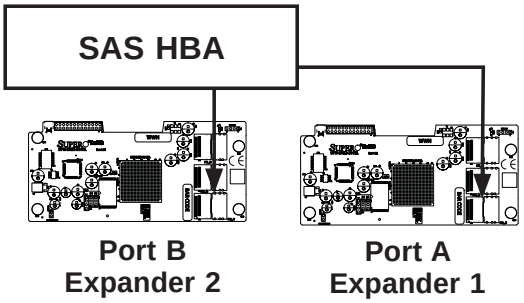


Figure 3-3: Single HBA

Single Host Bus Adapter Failover

If the expander or data path in Port A fails, the system automatically switches to Port B.

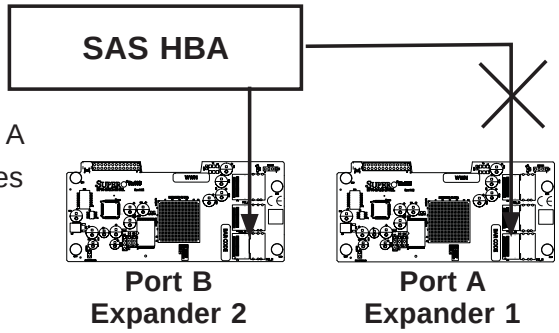


Figure 3-4: Single HBA Failover

3-3 Failover with RAID Cards and Multiple HBAs

The SAS-216EL backplane may be configured for failover with multiple HBAs using either RAID controllers or HBAs to acheive failover protection.

RAID Controllers: If RAID controllers are used, then the failover is accomplished through port failover on the same RAID card.

HBAs: If multiple HBAs are used to achieve failover protection and load balancing, **Linux MPIO software must be installed and correctly configured to perform the load balancing and failover tasks.**

Dual Host Bus Adapter

In a Dual Host Bus Configuration, the backplane connects to two Host Bus Adapters (HBA).

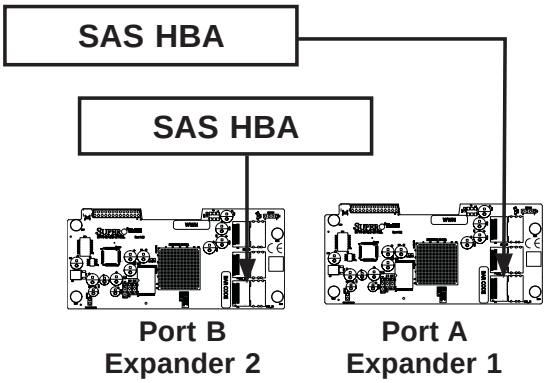


Figure 3-5: Dual HBA

Dual Host Bus Adapter Failover

If the Expander or data path in Port A fails, the system automatically switches to Port B. This maintains a full connection to all drives.

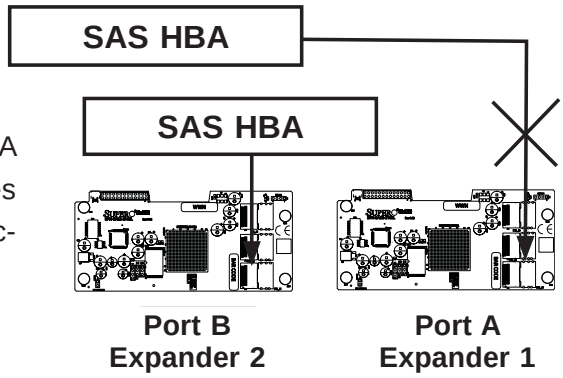


Figure 3-6: Dual HBA Failover

IMPORTANT: For RAID controllers, redundancy is achieved through port failover. For multiple HBAs MPIO software is required to achieve failover protection.

3-4 Chassis Power Card and Support Cables

Chassis Power Card

In a cascaded configuration, the first chassis includes a motherboard and at least one Host Bus Adapter (HBA). Other servers in this enclosed system must be equipped with a power card. This section describes the supported power card for the SAS2-216EL series backplane.

For more information, see the Supermicro Web site at http://www.supermicro.com.

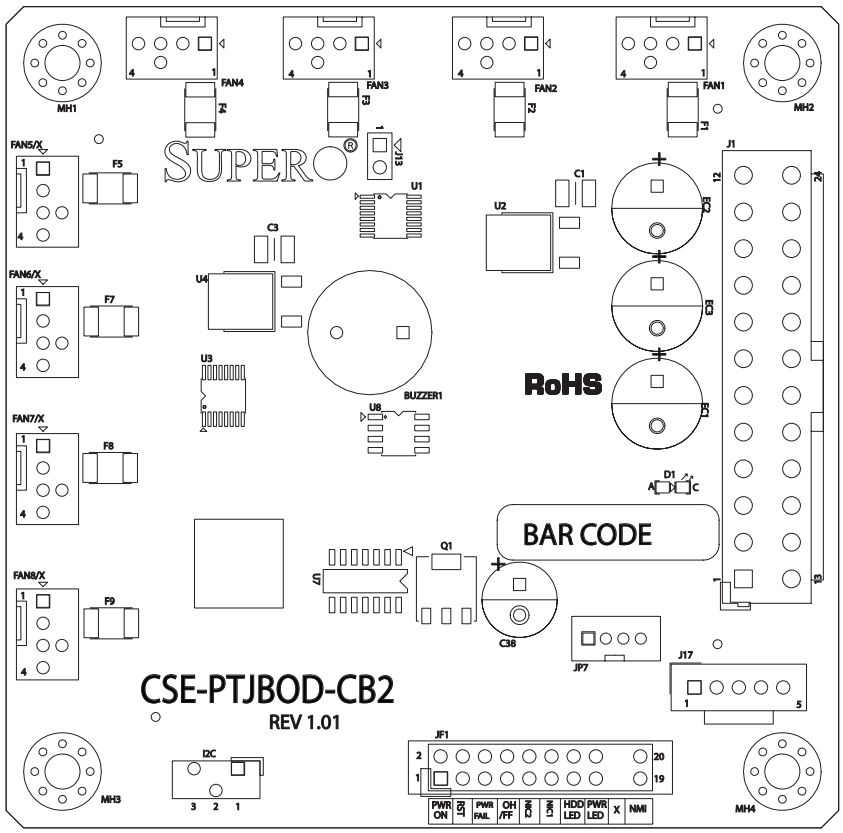


Figure 3-7: Chassis Power Card (Sold Separately)

Power Card		
Part Number	**Part Type**	**Where Used**
CSE-PTJBOD-CB2	Power Card	Allows the chassis to be used as a JBOD (Just a Bunch of Drives) system.

Connecting an Internal HBA to the Backplane

The following section lists the most common cables used to connect the HBA to the backplane.

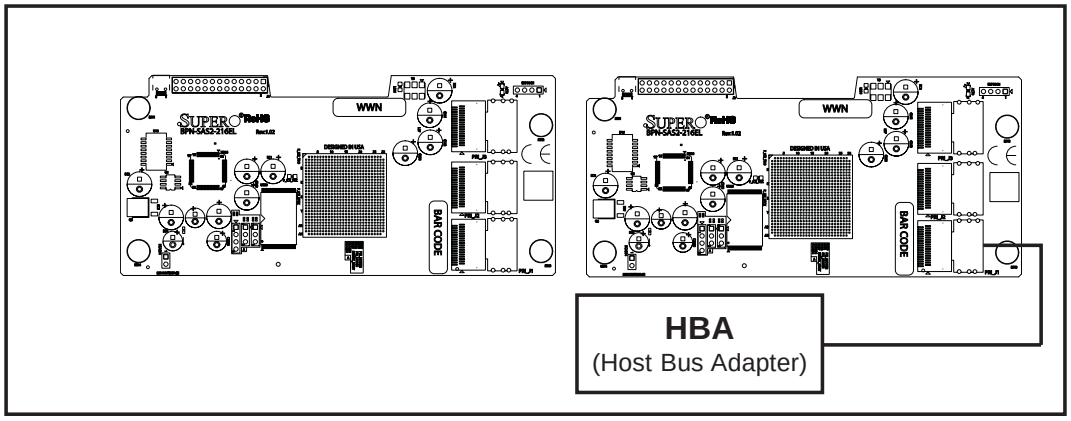


Figure 3-8: Single Internal Host Bus Adapter

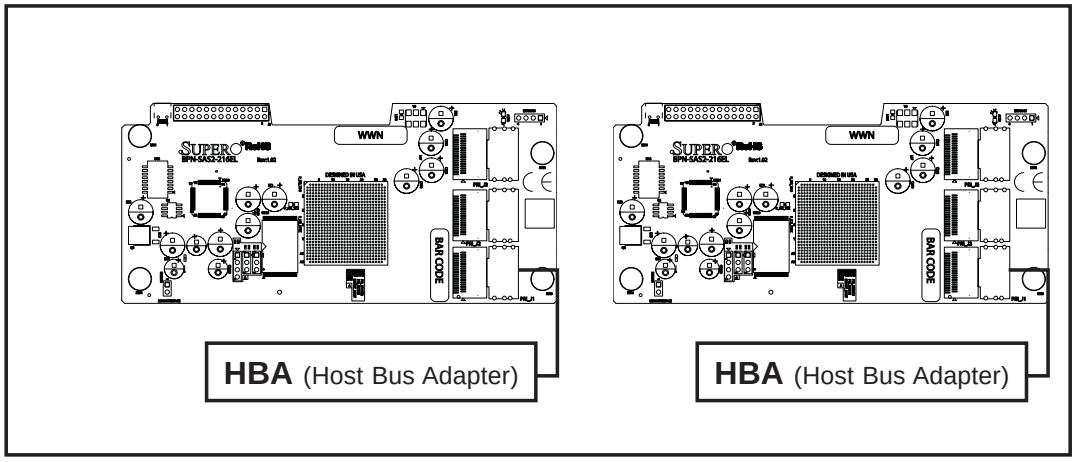


Figure 3-9: Dual Internal Host Bus Adapter

Supported Internal HBA Cables

Use the following cables to create connections between the internal HBA and SAS2-216EL model backplane. The cables required depend upon the HBA connector.

Cable Name: iPass TO 4-LANE
Part #: CBL-0117L
Length: 46 cm (18 inches)
Description: This cable has one SFF-8484 (32-pin) connector at one end and one iPass (SFF-8087/Mini-SAS) connector (36-pin) at the other. This cable connects from the HBA to the SAS2-216EL backplane

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

Cable Name: iPass (Mini-SAS) to iPass (Mini-SAS)

Part #: CBL-0108L-02	**Length:** 39 cm (15 inches)
Part #: CBL-0109L-02	**Length:** 22 cm (9 inches)
Part #: CBL-0110L-02	**Length:** 18 cm (7 inches)

Description: This cable has an iPass (SFF-8087/Mini-SAS) connector (36-pin) at each end. It connects from the HBA to the SAS2-216EL model backplane.

Connecting an External HBA to the Backplane

This backplane supports external host bus adapters. In this configuration, the HBA and the backplane are in different physical chassis. This allows a JBOD (Just a Bunch Of Drives) configuration from an existing system.

Single External Host Bus Adapter

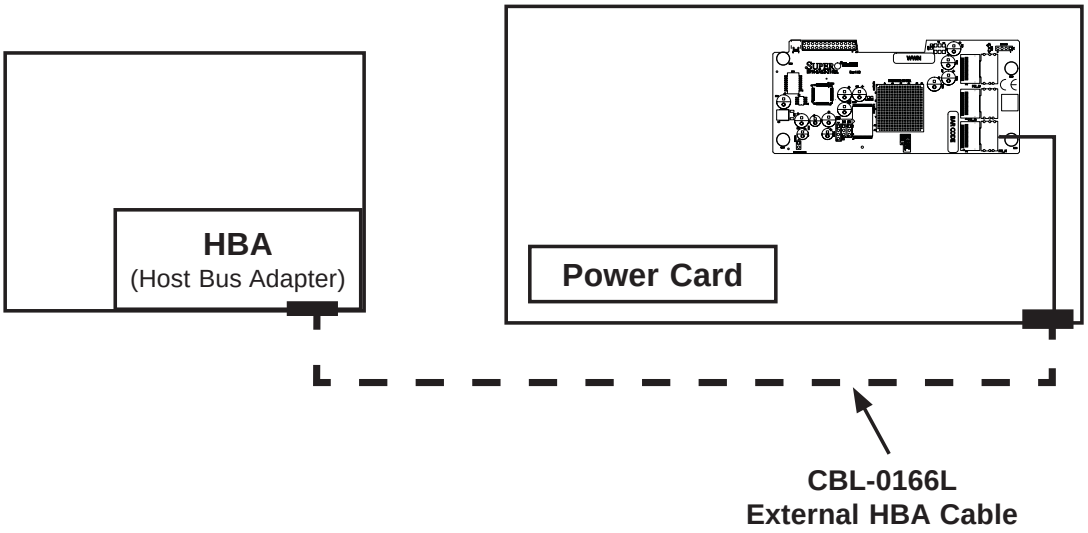


Figure 3-10: Single External Host Adapter

Dual External Host Bus Adapter

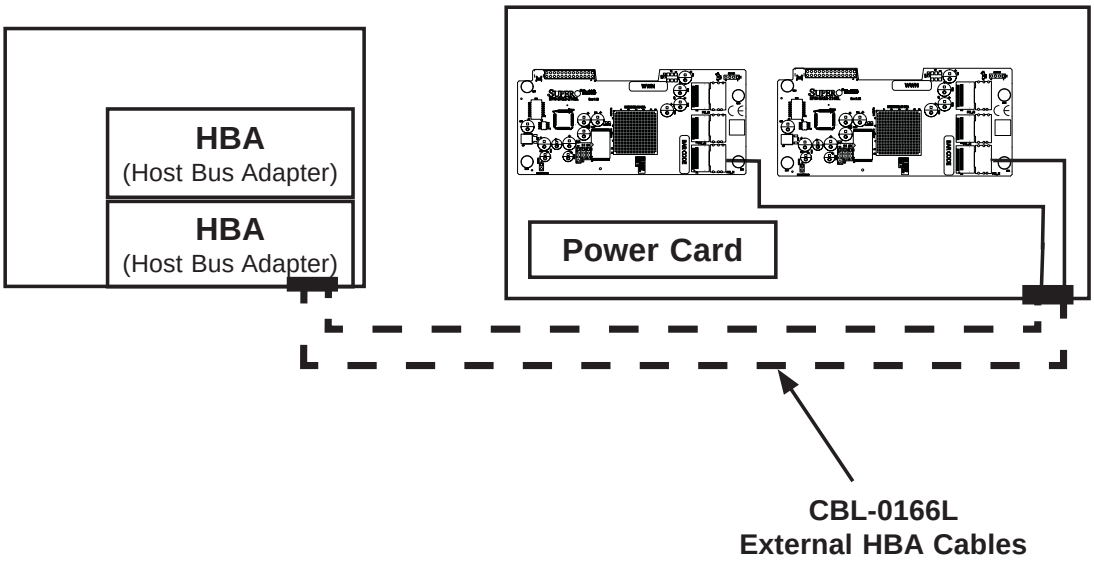


Figure 3-11: Dual External Host Bus Adapter

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

Supported External HBA to Backplane Cable

Use the following cable if your external HBA has an InfiniBand connector.

Figure 3-12: SAS InfiniBand Cable (CBL-0200L)

Cable Name: SAS InfiniBand to Mini-SAS X4 1M cable, PBF
Part #: CBL-0200L
Length: 1 meter
Description: This cable has an InfiniBand connector (SFF-8470) on one end and an SFF-8088-1X (26-pin) connector at the other end.

Connecting Multiple Backplanes in a Single Channel Environment

This section describes the cables used when cascading from a single HBA. These connections use CBL-0167L internal cables and CBL-0166L external cables.

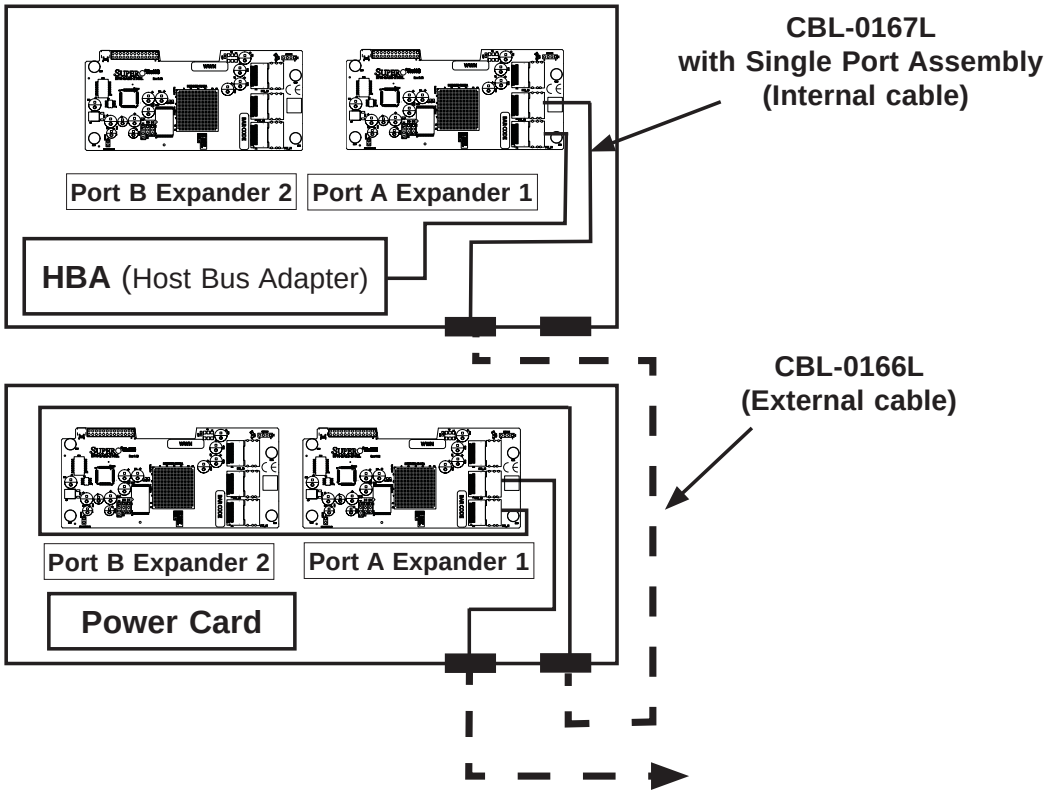


Figure 3-13: Single HBA Configuration

Single HBA Configuration Cables

Single Port Cable Assembly

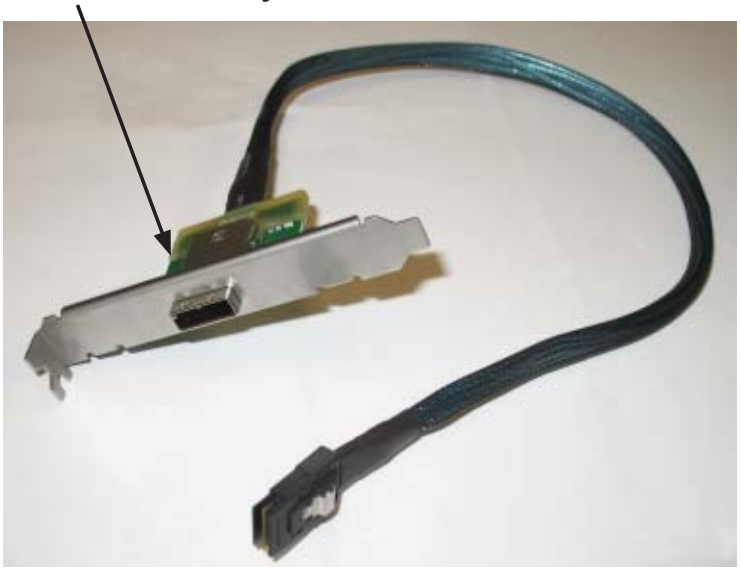


Figure 3-14: Single Port Internal Cable (CBL-0167L)

Cable Name: SAS EL2/EL1 Backplane Cable (Internal) with 2-port Cascading Cable, 68 cm

Part #: CBL-0167L (SFF-8087 to SFF-8088 x1)
Ports: Single
Placement: Internal cable
Description: Internal cable. Connects the backplane to the HBA or external port. Used in single port environments

Figure 3-15: External Cable (CBL-0166L)

Cable Name: SAS EL2/EL1 Cascading Cable (External), 68 cm

Part #: CBL-0166L (SFF-8088 1x to SFF-8088 x1)
Ports: Single or Dual
Placement: External cable
Description: External cascading cable. Connects ports between servers. With most connectors, use one cable for single port connections and two cables for dual port connections.

Connecting Multiple Backplanes in a Dual Channel Environment

This section describes the cables used when cascading from dual HBAs. These connections use CBL-0168L internal cables and CBL-0166L external cables.

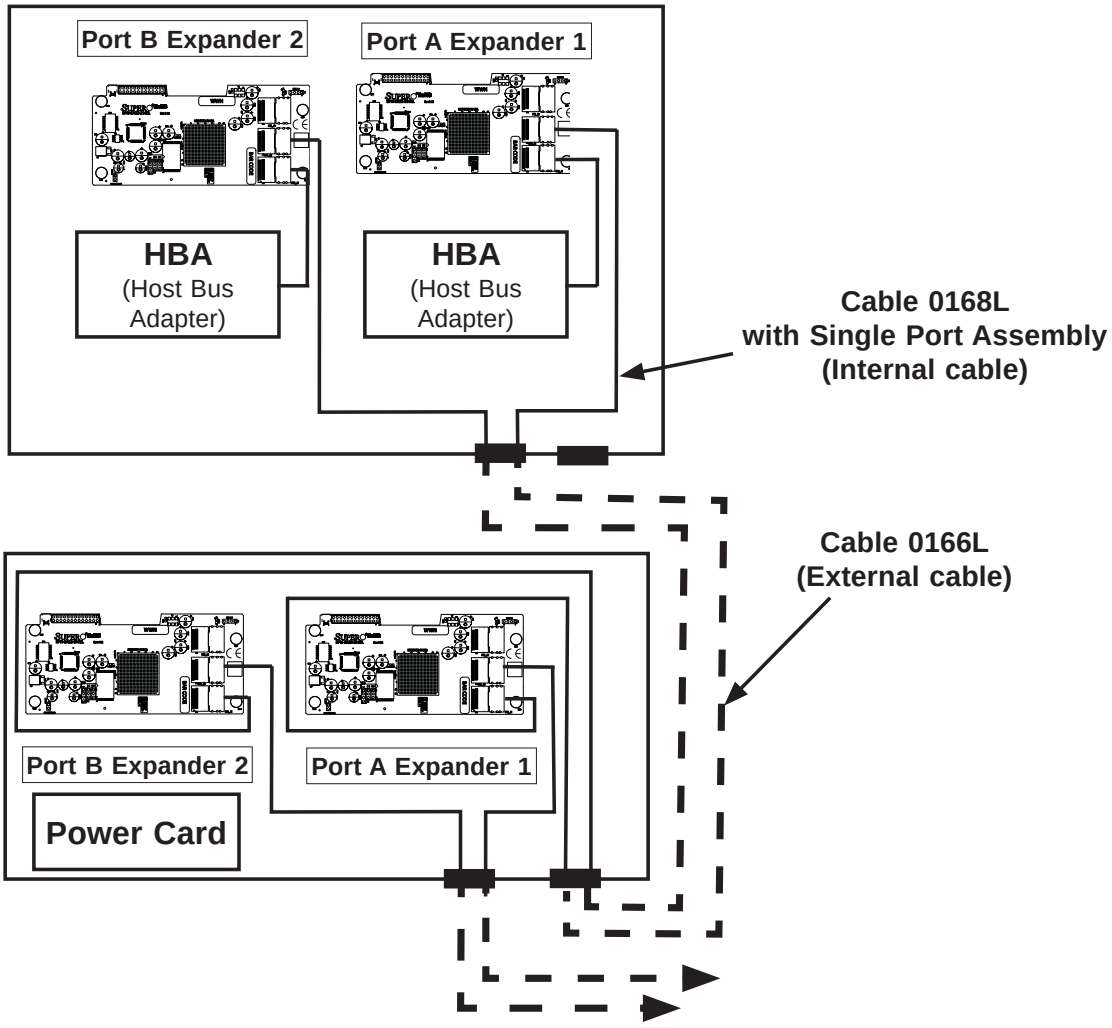


Figure 3-16: Dual HBA Configuration

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

Dual HBA Configuration Cables

Figure 3-17: Dual Port Internal Cable (CBL-0168L)

Cable Name: SAS Dual-port Cable Assembly, 68/76 cm

Part #: CBL-0168L
Placement: Internal cable
Ports: Dual

Description: Internal cascading cable. Connects the backplane to the host bus adapter or external port. Used in dual port environments.

Figure 3-18: External Cable (CBL-0166L)

Cable Name: SAS EL2/EL1 Cascading Cable (External), 68 cm

Part #: CBL-0166L
Placement: External Cable
Ports: Single or Dual

Description: External cascading cable. Connects ports between servers. Use one cable for single port connections and two cables for dual port connections.

3-5 Supported Cascading Configurations

Cascading allows the system to access data at a faster rate by allowing several backplanes to share resources to reduce latency time.

The first backplane in a cascaded system requires a motherboard and an HBA. Other servers require a power control card with no motherboard and no HBA. For more information, specific chassis manuals are available at www.supermicro.com.

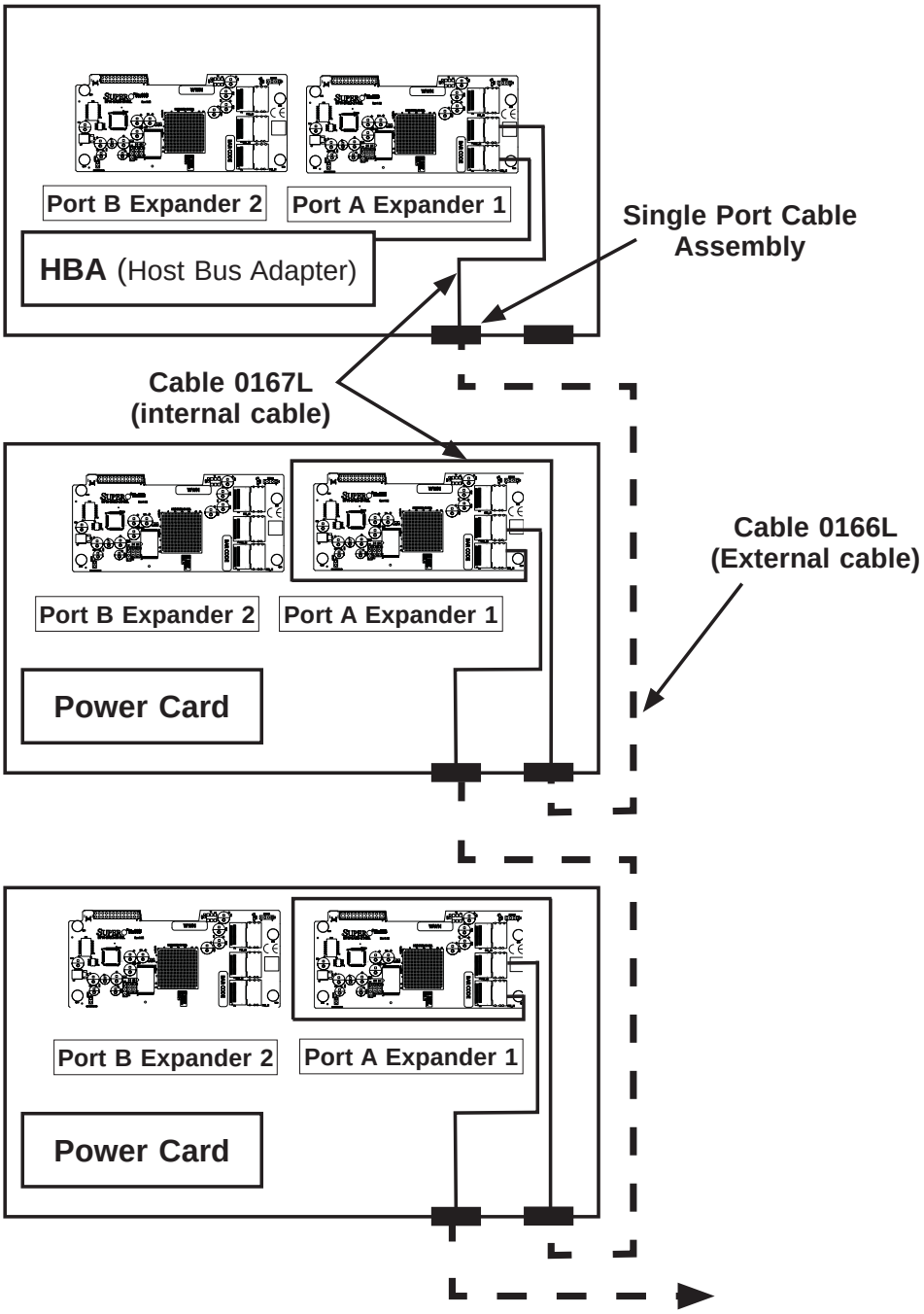


Figure 3-19: Simple Cascaded Configuration

Server System with Single SAS HBA

The expanders allow horizontal branching. This configuration also applies to dual ports.

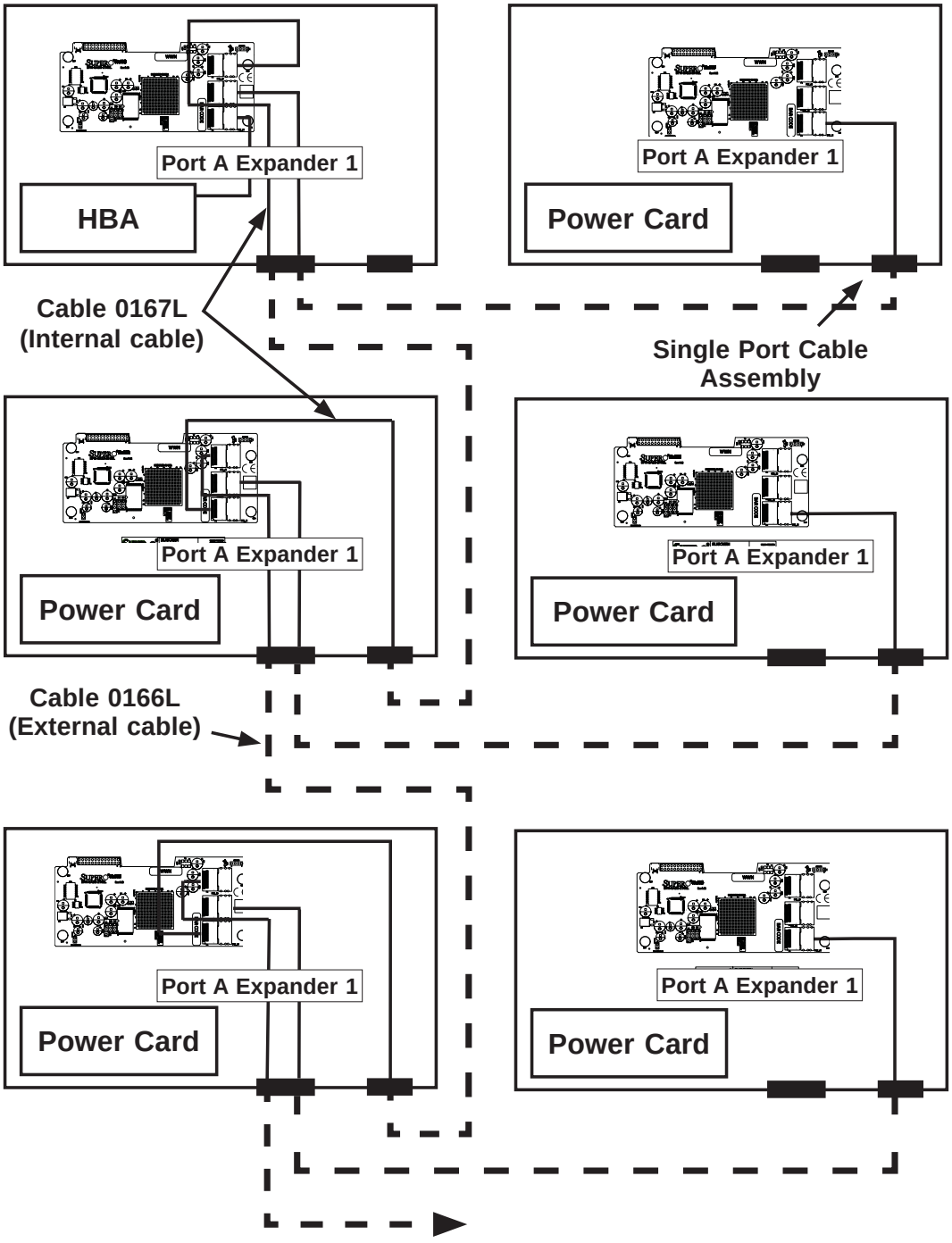


Figure 3-20: Cascaded Configuration with Horizontal Branching

Dual SAS HBA and Cascaded Configuration

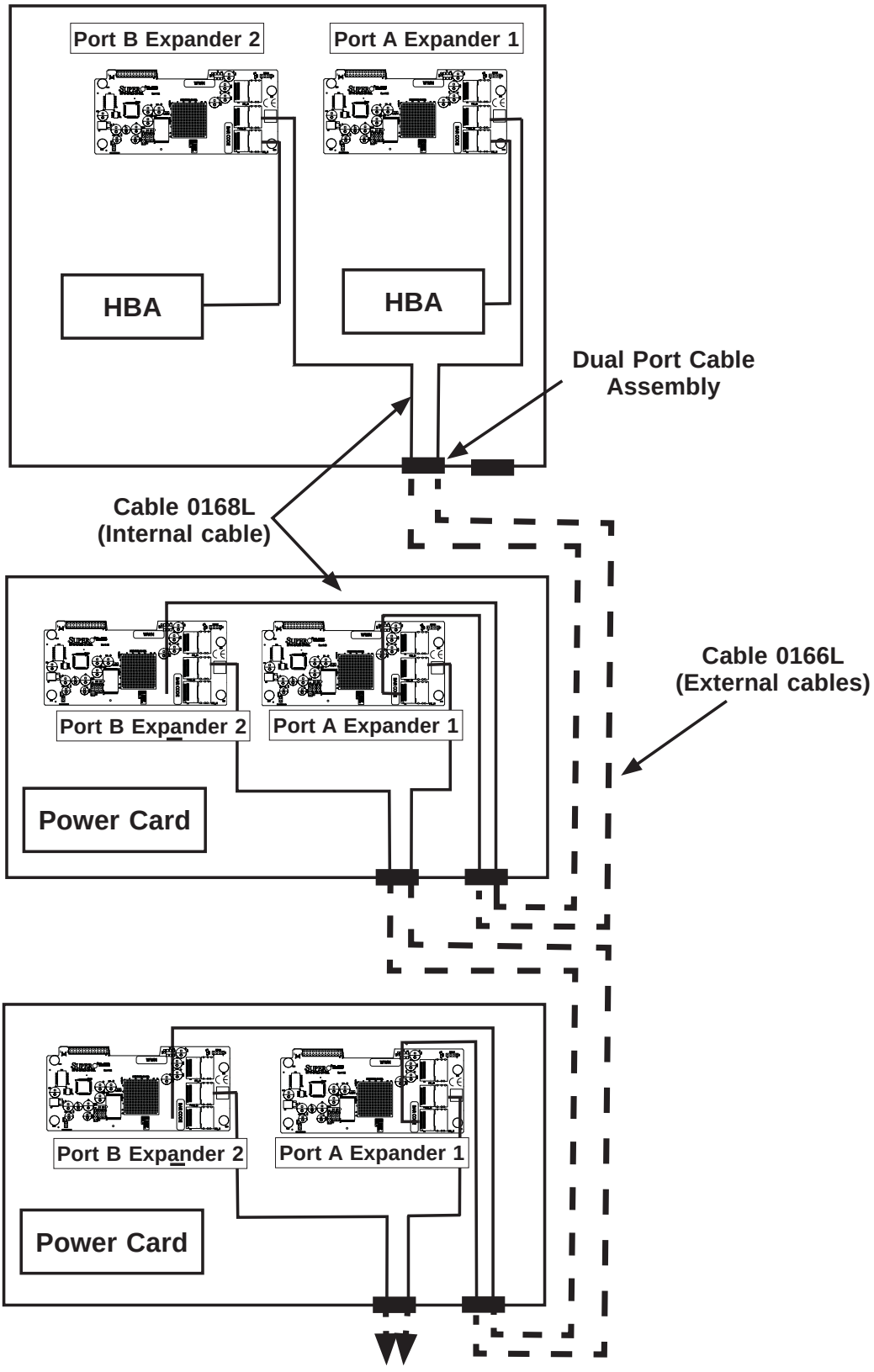


Figure 3-21: Dual SAS HBA with Cascaded Configuration

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

Dual SAS HBA and Cascaded Configuration with Branching

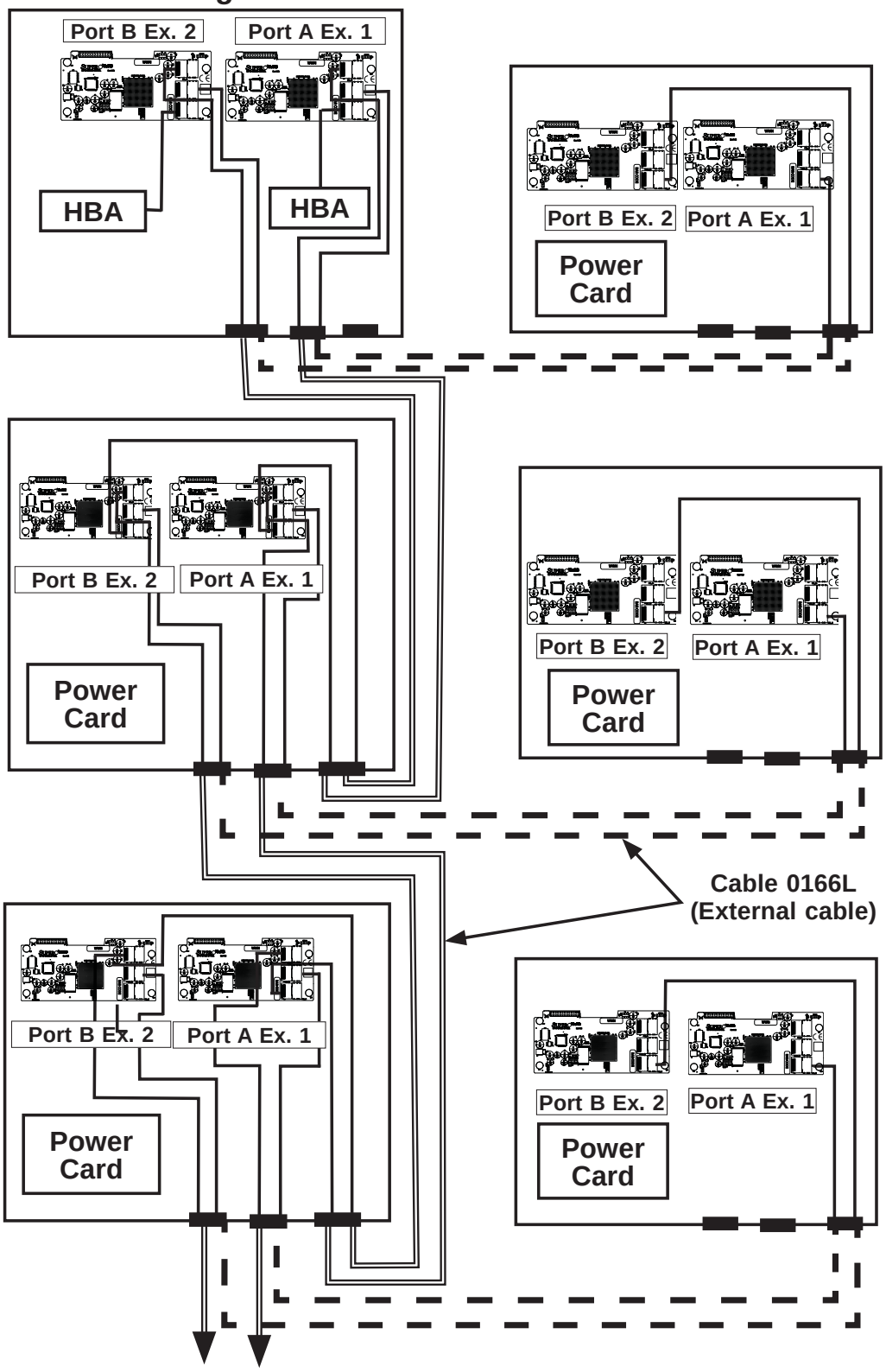


Figure 3-22: Dual SAS HBA Cascaded Configuration and Branching

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

Notes

Disclaimer (cont.)

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